COMPARISON OF MIDAZOLAM AND MINIDOSE SUCCINYL CHOLINE IN AIDING LMA INSERTION IN ADULT ELECTIVE SURGERY PATIENTS A RANDOMIZED CLINICAL TRIAL

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CERTIFICATE

This is to certify that the dissertation entitled, "**COMPARISON OF MIDAZOLAM AND MINIDOSE SUCCINYL CHOLINE IN AIDING LMA INSERTION IN ADULT ELECTIVE SURGERY PATIENTS - A RANDOMIZED CLINICAL TRIAL**" submitted by **Dr.R.J.BALAMURUGAN** in partial fulfillment for the award of the degree of Doctor of Medicine in Anesthesiology by the Tamilnadu Dr.M.G.R. Medical University, Chennai is a bonafide record of the work done by him in the Department of Anesthesiology, Madras Medical College, during the academic year 2007 -2010.

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CONTENTS

INTRODUCTION

Anaesthesia has made major advances in recent years. Considerable efforts have been devoted to airway management by the anesthesiologist during the past 20 years. A large number of supraglottic airway devices have been introduced recently. The original purpose was to reduce the need for more invasive methods of airway management while offering a more reliable alternative to the facemask. The laryngeal mask airway (LMA) is one such innovative device designed for airway management.

Dr.A.I.J. Brain originally described it primarily as an alternative to the facemask and the endotracheal tube[1]. ***Pennat J.H. White P.F.*** (1993), described it as the missing link between these two devices[2].

One of the principal aims of anaesthesia is to counter surgically induced stress. So the anesthesiologist should be able to use a method of delivering the anaesthetic that is by itself not stress inducing[3.] Since the LMA is placed directly over the posterior pharynx, it avoids tracheal stimulation and hence the

systemic and ocular stress response associated with tracheal intubation.

LMA offers distinct advantages over the facemask and the endotracheal tube. Compared to the facemask, the LMA maintains a better airway, frees the hands and thereby reduces the fatigue of the anesthesiologist. Oxygenation during anaesthesia has shown to be better with the LMA compared to the facemask. LMA is an extremely versatile device that can be used for the administration of inhaled anaesthetics, as a conduit for ventilation during administration of anaesthesia, as a device for emergency ventilation. It can also be used as a tracheal intubation assist device[2,4] and as an emergency airway device during resuscitation. Now, LMA is assuming an increasingly prominent role in management of patients with a difficult airway. The LMA, as a ventilatory device /intubating conduit is placed in the ASA difficult airway algorithm in five places.

Airway-related advantages of the LMA compared to the tracheal tube include better patient tolerance of the LMA, which results in a more secure artificial airway for a longer period of

time during emergence. Furthermore, it provides a clear airway in the postoperative period[5,6].

The LMA has gained widespread acceptance as general-purpose airway and is a used in up to 30% of patients undergoing general anaesthesia[7.]Despite the popularity of LMA for airway maintenance during general anaesthesia, there is a still no optimal induction technique that guarantees good insertion conditions while maintaining cardiovascular stability and rapid onset of respiration. The most popular induction agent for LMA insertion continues to be Propofol as this agent obtunds oropharyngeal reflexes [8,9]. Studies show an incidence of poor insertion conditions ranging from 38-60%[10,11,12] with standard induction doses (2-3mg/kg) of Propofol however its use in doses which allow adequate jaw relaxation and prevent patient reaction to LMA insertion[8,10] i.e., gagging, coughing, movements etc., commonly results in hypotension[13,14,15,16,17,18] and prolonged apnoea. Although this dose of Propofol may be well tolerated by a fit patient, it may not be tolerated by elderly patients and in those patients with cardiovascular disease.

There have been numerous studies that looked into co-induction techniques combining a lower dose of Propofol or thiopentone with other agents, including Benzodiazepines[19,20,21,22], rapidly acting opiates[11,22], neuromuscular agents[23,24,25] and topical[26] and intravenous local anaesthetic agents. Use of rapid onset, neuromuscular blocking agents such as succinylcholine, suppresses the laryngeal reflexes by depolarization of motor-neuron end plates. However their use may result in significant myalgia[27]and prolonged apnoea. ***Nimmo and colleagues*** suggested that this adverse reactions can be avoided by reducing the doses of suxamethonium substantially27.Also studies suggest that midazolam, a short acting benzodiazepine, aids LMA insertion through its centrally acting muscle relaxant properties.

A prospective randomized controlled study was constructed to compare the usefulness of midazolam and mini dose succinyl choline to aid LMA insertion during propofol anesthesia, in patients coming for elective short general surgery procedures.

The study was conducted in Department of Anesthesiology, Madras Medical College.

LARYNGEAL MASK AIRWAY

Dr Archie Brain invented the laryngeal mask airway at London hospital, ***White Chapel*** in 1981. LMA has ribbed orifices at the patient end that is continuous with the large tube. The ribs protect against airway obstruction by the epiglottis. Mask is connected to the lumen at an angle of 30. The mask is equipped with an inflatable cuff intended for airtight seal around the larynx. It has a pilot balloon with an inflatable valve, inflating tube which aids the inflation of the cuff. The black line runs along the whole length of the tube up to the mask and serves to indicate the correct position of the mask in the airway. At the machine end of the tube there is a standard 15mm connector.

LMA is constructed from silicone rubber,(avoiding latex and thereby latex allergy), and also has an advantage that it can be autoclaved and reused. LMAs are available in the following sizes,1,1.5,2,2.5,3,4,5,6 .Volume of air injected to inflate the cuff ranges from 4ml for 1 size LMA to 40ml for 6 size LMA. The volume to be injected is written on the LMA itself.

TYPES OF LARYNGEAL MASK AIRWAY

LARYNGEAL MASK AIRWAY UNIQUE

The cuff of this LMA is made up of PVC. It is a disposable LMA used in emergency situations.

FLEXOMETALLIC LARYNGEAL MASK AIRWAY

It consists of a wire reinforced tube connected to a standard laryngeal Mask. It can be used for head and neck surgeries.

INTUBATING OR FASTRACH LARYNGEAL MASK AIRWAY

It is used for difficult intubations where we can intubate with 8mm ID endotracheal tube through the laryngeal mask airway.

LARYNGEAL MASK AIRWAY – PROSEAL

It is designed for use in positive pressure ventilation at high airway pressures. The mask has a cuff which seals around laryngeal opening and a rear cuff that acts to increase the seal. A drain tube is present within the mask.

CHECKING OF LMA

The device can be re-used after autoclaving up to 40 times according to manufactures' recommendation. LMA must be checked before each use. The exterior of the tube should be checked for cracks. The interior of the tube should be checked for any foreign body. The cuff of the LMA should be tested by filling with air, 50% more than the recommended volume for any leaks.

LMA INSERTION – STANDARD TECHNIQUE

The cuff must be fully and correctly deflated before placement. This imparts rigidity to the tip of the cuff. The deflated cuff should be free from wrinkles and its rim should face away from the masks aperture.

A lubricant, usually 2% lignocaine jelly is applied to the posterior surface of the cuff just before placement. This prevents the cuff tip from rolling over on contact with the palate. Lubricant applied on the anterior surface may block the aperture or be inhaled causing airway obstruction, coughing and laryngospasm. After adequate general anesthesia or topical anesthesia (or complete muscle relaxation have been achieved,)

patients neck is flexed and head extended by pushing the head with the non dominant hand (sniffing position). Open the mouth with the 3rd finger of the dominant hand. LMA is held between the index finger and thumb of the dominant hand as close to the junction of the tube and the mask. The aperture of the mask faces the chin. The tip of the cuff is placed against the inner surface of the patients upper incisor teeth. It is important that at this point the tube should be parallel rather than vertical. The mask is then pressed upwards against the hard palate and advanced into the oral cavity maintaining upward pressure. When the device is advanced, it is essential that the tip of the LMA should not roll over. When the mask is fully advanced, resistance will be felt. The tube is then held in the non dominant hand and the index finger is withdrawn. Appropriate volume of air should be used to inflate the cuff. The tube will move slightly out of the mouth when the cuff is inflated. This confirms the position of the mask. Then the LMA is connected to the breathing circuit and adequacy of ventilation should be assessed. A bite block inserted into the mouth.

PARTIAL INFLATION TECHNIQUE

The cuff of the LMA is partially inflated before insertion. In this technique the incidence of down folding and trapping of epiglottis is reduced.

180 DEGREE TECHNIQUE

In this technique LMA is inserted with the laryngeal aperture pointing cephalad and rotate it 180 degrees. This method is useful in paediatric patients.

ANATOMICAL POSITION OF LARYNGEAL MASK AIRWAY

When the LMA is placed correctly its distal part occupies the hypopharynx and the tip rests on upper oesophageal sphincter at the level of sixth cervical vertebra. Thus the distal part of the LMA lies posteriorly to the thyroid cartilage and the tip of the LMA lies at the level of cricoid cartilage. The sides of the mask face into the pyriform fossae. The proximal edge of the mask is under the base of the tongue below the level of tonsils. When the tube is fixed properly the curve of the tube should follow that of the palate. Epiglottis is prevented by median aperture bars from obstructing the airway. The mean distance from the grill of the

mask to the vocal cord is 3.1cms in women and 3.6cms in men. When the cuff of the mask is being inflated the thyroid, arytenoids and cricoid cartilages are pushed anteriorly and tissues overlying the larynx bulge out slightly.

REMOVAL OF LARYNGEAL MASK AIRWAY

LMA should be removed only when the patient responds to oral commands and their protective airway reflexes have returned to normal. LMA should not be removed in lighter planes as this may cause coughing and laryngospasm.

ADVANTAGES OF THE LARYNGEAL MASK AIRWAY

Easy placement in trained hands.

Shorter time for insertion

Minimal hemodynamic changes during insertion and removal

Minimal stimulation if left insitu until protective reflexes have returned

Minimal increase in intra ocular and intra cranial pressures

Reduced incidence of sore throat.

DISADVANTAGES OF LARYNGEAL MASK AIRWAY

Gastric inflation can occur and risk of aspiration not eliminated

Obstruction by epiglottis

Laryngospasm during lighter plane.

INDICATIONS OF LARYNGEAL MASK AIRWAY

Emergency airway management in failed intubation

Surface surgeries of trunk and extremities

Minor urological and gynaecological procedures

Useful in patients where maintenance of airway is difficult such as edentulous patients, facial injury, burns.

Can be used for diagnostic bronchoscopy, laryngoscopy

For emergency securing airway during CPR

CONTRA INDICATIONS

Patients with full stomach

Abnormal airway anatomy like tumour

Restricted mouth opening.

PHARMACOLOGY

The main drugs used in our study are **Propofol, Midazolam and Succinyl choline.** The pharmacology of the drugs are discussed below.

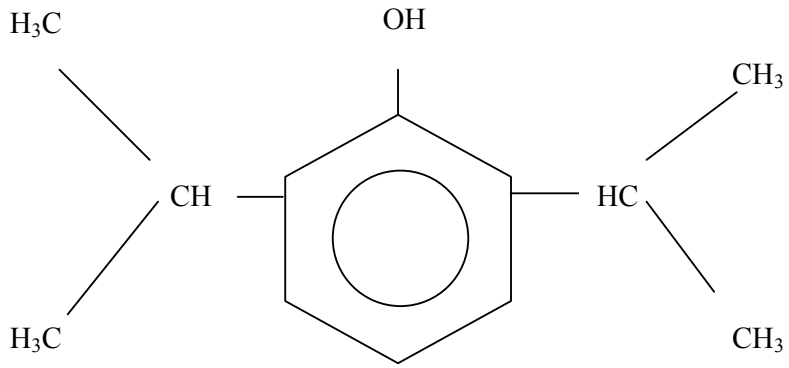
PROPOFOL

Propofol (ICI 35868, Diprivan Propovan) is a recent intravenous anaesthetic to be introduced into the clinical practice work in 1970s on substituted derivatives of phenol with hypnotic properties resulted in the development of 2,6, di iso propylphenol. The first clinical trial by ***Key and Rolly*** reported in 1977 confirmed the potential of propofol as an anesthetic induction agent.

Physicochemical Properties

Propofol is a hindered phenol, which is chemically dissimilar to any other compounds used in anaesthesia.

It is 2,6, Di – isopropylphenol



Propofol is oil at room temperature and it is insoluble in water and therefore it was initially prepared with cremophor EL. Because of anaphylactoid reaction associated with cremophor EL in this early formulation of the Propofol the drug was reformulated in an emulsion.

The present formulation consist of

- 1% (wt/Vol) Propofol
- 10% (w/v) soyabean oil
- 2.25% (w/v) glycerol
- 1.2% (w/v) purified egg phosphatide

The pH is 6- 8.5 (7) and the PKa of the drug in water is 11. The solution appears as lightly viscous, milky white substance. It is made isotonic with glycerol and is sealed under nitrogen. Propofol is available as a 1% solution in 10 ml, 20 ml, and 50ml vials and 10 ml ampoules. It is stable at room temperature and is not light sensitive.

The precautions which apply to intravenous fat emulsions must be taken with Propofol, that is, it should be stored below 25^{o}C but must not be frozen. Ampoules should be shaken before use. Filters should not be used during administration of emulsion. It should not be mixed before administration with other therapeutic agents or infusion fluids. It can be administered through a Y – piece close to the injection site into crystalloid infusion such as dextrose or normal saline.

PHARMACOKINETICS [41,42]

Propofol is rapidly metabolized in the liver by conjugation to glucuronide and sulfate to produce water soluble (2,6 di-isopropyl 1,4 quinol and other) compounds, which are excreted by the kidneys. Less than 1% Propofol is excreted unchanged is urine and only 2% excreted in faeces. The metabolites of

Propofol are thought not to be active. Because clearance of Propofol exceeds hepatic blood flow, extra hepatic metabolism or extrarenal elimination has been suggested. Extra hepatic metabolism has been confirmed during the anhepatic phase of patients receiving a transplanted liver.

Women have a higher volume of distribution and higher clearance rates. The elderly have decreased clearance rates but smaller central compartment volume. Children have a large central compartment volume and a more rapid clearance. Hepatic disease appears to result in a larger steady state and central compartment volumes. Clearance is unchanged but the elimination half – life is slightly prolonged.

PHARMACODYNAMICS[43]

Effect on Central Nervous system (CNS): Propofol is primarily a hypnotic. The exact mechanism of action has not yet been fully elucidated, however, evidence suggest that it acts by enhancing the function of GABA activated chloride channel. Though Propofol has no analgesic property as such, propofol does not produce antanalgesia and clearly superior to thiopentone in this respect. At subhypnotic doses, Propofol will provide sedation and amnesia. The effects of Propofol on

EEG are the initial increase in α rhythm followed by shift to δ and θ frequency. High infusion rates produce burst suppression.

Several recent studies have shown a direct anticonvulsant effect of Propofol, which is dose dependent. Propofol does not alter brain stem auditory evoked potential. Propofol will decrease the intracranial pressure (ICP) in patients with either normal or elevated ICP. It also reduces cerebral perfusion pressure. Normal cerebral reactivity to CO_2 and autoregulation are maintained during Propofol. Propofol reduces the $CMRO_2$.

Effect on Cardiovascular System (CVS): The most prominent effect of Propofol on CVS is a decrease in arterial blood pressure during induction of anaesthesia. It produces 25% to 40% (Mean 30%) reduction of systolic blood pressure. Similar changes are seen in mean and diastolic pressure. The decrease in arterial pressure is associated with a decrease in cardiac output / cardiac index (about 15%), stroke volume index (about 20%) and systemic vascular resistance (15 to 20%).

But reduction in arterial pressure is largely due to the decrease in systemic vascular resistance. The hypotensive effect of Propofol is more marked when the drug is given by intermittent administration even for short procedures. During the maintenance of anaesthesia with a Propofol

infusion, systolic pressure remains between 20% and 30% below preinduction levels.

The decrease in systemic pressure following induction dose of Propofol appears to be due to both vasodilatation and myocardial depression. Both the myocardial depressant effect and vasodilatation appear to be dose and plasma concentration dependent. The vasodilatory action is due to a direct effect on intracellular smooth muscle Ca^{++} mobilization. Heart rate does not change significantly after an induction dose of Propofol. It has been suggested that Propofol either resets or inhibits the baroreflex, thus reducing the tachycardiac response to hypotension. An infusion of Propofol results in a significant reduction in both myocardial blood flow and myocardial oxygen consumption.

Effect on Respiratory System (RS) : The first disturbance seen after administration of a bolus dose of Propofol is a profound fall in tidal volume leading to apnoea[44]. The incidence and duration of apnoea are dependent on dose, premedication and speed of injection. The apnoea occurring with Propofol however may be prolonged to more than 30 seconds. The incidence of prolonged apnoea (longer than 30 seconds) is further increased by addition of an opiate either as a premedication or just prior to induction. A maintenance infusion of Propofol results in a 40%

decrease in tidal volume and a 20% increase in respiratory rate. The ventilatory response to carbon dioxide & hypoxia are depressed.

Other Effects

- Propofol does not trigger malignant hyperpyrexia and is probably the anaesthetic of choice in patients with this condition.
- Propofol also possess significant antiemetic property at low (subhypnotic) doses. Propofol as an infusion of 1mg/kg/hr provided excellent antiemetic action following chemotherapy

Side Effects

1. Pain on injection – its reduced by using a large vein, avoiding the vein on the dorsum of the hand, adding Lignocaine to the Propofol infusion.
2. Excitatory effects like myoclonus i.e. muscle twitching, tremors; hiccup may occur following Propofol administration.
3. Apnoea following the Propofol as an induction agent is common, which lasts for 30s or for longer duration. The addition of an opiate increases the incidence of apnoea especially prolonged apnoea.

4. The most significant side effect on induction is the decrease in systemic blood pressure. Perhaps slow administration and lower dose in adequately pre hydrated patients may attenuate the decrease in arterial blood pressure.

Contraindications

- As Propofol produces fall in arterial blood pressure it cannot be used in patients in shock and hypotension
- Should not be used in patients with history of hypersensitivity to Propofol

Clinical Uses

- ***Induction and maintenance of anaesthesia*** – Propofol is suitable for both the induction and maintenance of anaesthesia. Propofol because of its pharmacokinetics, provides a rapid recovery and is thus superior to barbiturates. For maintenance of anaesthesia, Propofol can be given as intermittent boluses or as a continuous infusion.
- ***Propofol for outpatient surgery*** – Propofol when used for induction of anaesthesia in shorter procedures, results in a

significantly quicker recovery and an earlier return of psychomotor function. The incidence of nausea and vomiting are markedly less when Propofol is used for induction.

- Recovery from anaesthesia with Propofol is sufficient to allow the patients to be sent home on the same day, after the surgery is performed. walking ability and correct balance also returns more quickly after propofol anaesthesia

- ***Propofol for Total intravenous anaesthesia –*** Propofol produces satisfactory conditions for surgery with no unwanted effects during maintenance.

- ***Propofol for sedation –*** Propofol by continuous infusion[45] provides a readily titratable level of sedation and rapid recovery once the infusion is terminated, irrespective of the duration of the infusion.

- Propofol can be used for sedation as an adjunct to regional anaesthesia. It can be used as an infusion or in the form of intermittent doses.

Doses of Propofol

Induction of General anaesthesia	1 – 2.5mg/kg IV (Dose reduced with increasing age)
Maintenance of General Anaesthesia	50 – 150 µg/kg/min I.V. combined with N_2O or opiate
Sedation	25 – 75 µg/kg/min I.V.

SUCCINYL CHOLINE

History: The first report on the administration of Succinylcholine for performing endotracheal intubation in multiple cases in the ED was published by ***Thompson et al***

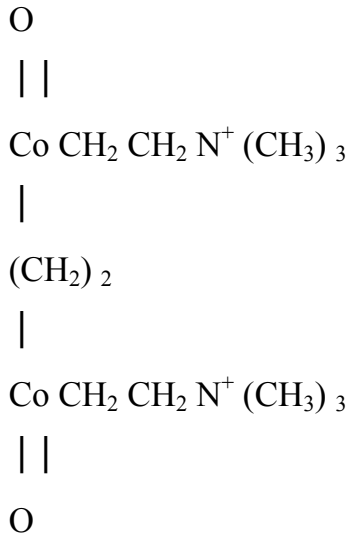
1906 – ***Reid hunt*** described its pharmacological actions ;

1949 **–** ***Bovet et al*** described its neuromuscular blocking actions;

1951 **–** ***Thesleff*** first used the drug in man at Stockholm.

Chemistry: Succinyl choline is a synthetic muscle relaxant, a quaternary amine ester, consisting of two molecules of acetylcholine joined together through their acetyl groups.

MOLECULAR STURTURE OF SUCCINYL CHOLINE



Presentation: As a solution, it is available in 10ml vials containing 50mg/ml and in vials containing 100mg powder form**.** Storage: 4^0C. Spontaneous hydrolysis occurs in warm/alkaline conditions.

Routes of administration: Intravenous/ Intramuscular

Dose: ED_{95} - 0.51 – 0.63 mg/kg

Intubation dose - Adults: 1-1.5 mg/kg IV bolus

Children: 2-2.5 mg/kg

Onset of action - 30 to 60 sec.

Duration of action - 4 to 10 min.

Mechanism of action: succinylcholine attaches to each of the alpha subunits of the nicotinic cholinergic receptor and mimics the action of acetyl choline thus depolarizing the post junctional membrane. Here, the hydrolysis is slow resulting in sustained depolarization (opening) of the receptor ion channels. Neuromuscular blockade develops because a depolarized post junctional membrane cannot respond to subsequent release of acetyl choline (Depolarizing Blockade). It is otherwise called as *Phase I Blockade*, which is characterized by

a) Absence of fade with TOF or tetanic stimulation.

b) Absence of post tetanic facilitation

c) Increased blockade with anticholinesterase drug such as Neostigmine and Edrophonium

The pre synaptic receptors are involved in the production of fasciculations.

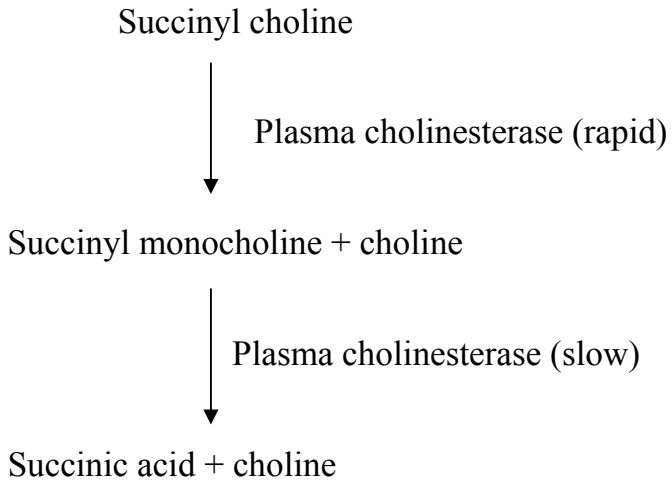
Phase II Blockade :(non-depolarizing/dual)

- Single large dose of succinyl choline (> 2mg /kg IV)
- Repeated small doses of succinyl choline
- Prolonged continuous infusion

may result in post junctional membranes that do not respond normally to Acetyl choline even when the post junctional membranes have become repolarized (desensitization blockade). Mechanism for this blockade is unknown. Phase II blockade has non-depolarizing characteristics such as

a) fade with TOF or tetanic stimulation
b) post tetanic facilitation
c) antagonism of blockade with anticholinesterase agents

Metabolism: Succinyl choline is rapidly hydrolyzed by plasma cholinesterase to choline and succinyl monocholine**.**



Dibucaine number and pseudo cholinesterase activity

Dibucaine, a local anaesthetic, inhibits the normal pseudo cholinesterase activity by about 80% and the homozygous atypical

enzyme by about 20%. The heterozygous enzyme is characterized by an intermediate 40 – 60% inhibition. The percentage inhibition of cholinesterase by 10^{-5} molar solution of Dibucaine is termed the Dibucaine number. The percentage of inhibition of cholinesterase by 5 x 10^{-5} molar sodium fluoride is termed as Fluoride number. Dibucaine number indicates the genetic make up of an individual with respect to pseudo cholinesterase. It does not measure the concentration of the enzyme in the plasma nor does it indicate the efficiency of the enzyme in hydrolyzing the substrate such as succinyl choline. The activity of the enzyme refers to the number of substrate molecules in mmols hydrolyzed per unit of time. Pseudo cholinesterase activity is certainly markedly influenced by the genotype, but is also dependent on the concentration of the enzyme in the plasma. Of the population 94% are normal E^u E^u genotypes with normal enzyme activity and a DN of 75 – 85.

Three abnormal genes exist:

1. E^a (atypical) homozygotes comprise 0.03% of the population;
2. E^f (fluoride resistant) homozygotes comprise 0.0003% of the population;
3. E^s (silent) homozygotes comprise 0.001% of the population.

Normal serum cholinesterase level about 80 u/ml

Heterozygous atypical enzyme: occurs in 1/50 patients resulting in a slightly prolonged block (20 – 30 mins), whereas **Homozygous atypical enzyme**: occurs in 1/3000 patients resulting in a very long blockade (6 – 8 hrs).

Abnormalities of suxamethonium metabolism:

1. Abnormal plasma cholinesterase (inherited):

    i. Atypical cholinesterase – Mendelian recessive E^a E^a homozygotes (1/3000 population) have 1 – 2 hr apnoea, during which phase 2 block develops (DN 16 – 25). Heterozygotes (1/25 population) have little or no disturbance (DN 50 – 65), with apnoea upto 10 mins.

    ii. Fluoride resistant – homozygotes have 1 h apnoea, with phase II block (DN 16 – 25). Heterozygotes have 10 min apnoea (DN 50 – 65).

    iii. Silent gene

2. Plasma cholinesterase deficiency

Factors lowering pseudo cholinesterase concentration are

i. liver disease

ii. pregnancy

iii. burns

iv. drugs – OCPs, MAO inhibitors, echothiophate, cytotoxic drugs, anticholinesterases, tetrahydroaminacrine, metoclopramide, hexafluorenium, bambuterol, Esmolol.

v. neoplastic disease

Adverse Effects

1. Prolonged apnoea: As discussed above, patients with abnormal pseudocholinesterase or deficient enzyme will experience markedly prolonged paralysis (range: 20 mins – 8 hrs.)

2. Cardiovascular effects : Bradycardia: It is the most frequently encountered change in rate. It is usually seen after the administration of relatively large single dose injections. The higher incidence of bradycardia after a second dose of succinyl choline suggests that the

hydrolysis product of succinyl choline may sensitize the heart to a subsequent dose. Succinyl choline stimulates all cholinergic autonomic receptors – nicotinic receptors on both sympathetic and parasympathetic ganglia, and muscarinic receptors in the sinus node of the heart. In low doses, both negative inotropic and chronotropic responses may occur and in large doses, these effects may become positive. One prominent clinical manifestation of this generalized autonomic stimulation is the development of cardiac arrhythmias, such as nodal bradycardia and ventricular ectopics, ventricular fibrillation. A high vagal background may predispose to asystole when a single dose of succinyl choline is administered.

3. Fasciculations: Appear within a few seconds of succinyl choline administration and are most often evident in young muscular adults. They are uncommon in children and intensity is less in the elderly. Muscle fasciculations can increase serum potassium level by 0.5-1.0 meq/L and produce arrhythmias. The mechanism is most likely a depolarization of nerve terminals through succinyl choline's action at the presynaptic receptors. This produces anti-dromic firing in the nerve, with the propagation of the action potential to all branches supplying a motor unit. The extension of fasciculations in the body is dependent on the arterial

blood distribution. Muscles close to the aorta and receiving the drug first are early affected.

4. Muscle pains: There is increased incidence of post-operative myalgia, 24 – 48 hrs after succinyl choline, more frequently following minor surgery, especially in women and in ambulatory. Pregnancy and extremes of age seems to be protected. Pain is secondary to damage produced in muscle by the unsynchronized contractions of adjacent muscle fibers just before the onset of paralysis. The finding of myoglobinemia and increased serum Creatine kinase following succinylcholine administration substantiates this. The efficacy of non-depolarizing pre-treatment is controversial.

5. Hyperkalemia :Potassium is released from muscles following suxamethonium injection, causing a rise of serum potassium of 0.2 – 0.4 mmols/L. A life threatening elevation of potassium is possible in patients with

a) Massive trauma, closed head injury

b) Muscular dystrophy, neuropathies, denervation, stroke

c) Third degree Burns

d) UMN/ LMN Lesions

e) Tetanus

f) Spinal cord injuries

g) Congenital cerebral palsy

h) Wasting secondary to chronic arterial insufficiency

i) Prolonged total body immobilization

j) Severe intra-abdominal injury

In denervation, the extra-junctional receptors allow succinyl choline to effect widespread depolarization and extensive potassium release.

6. Malignant Hyperpyrexia: Suxamethonium is a potent triggering agent in patients susceptible to malignant hyperthermia, together with potent inhalation agents.

7. Increased Intra Gastric Pressure : Increases to >20 mmHg due to severe muscle fasciculations. However, it causes a greater rise in lower esophageal sphincter tone, and hence it does not appear to increase the risk of aspiration unless the LES is incompetent, such as in pregnancy, hiatus hernia and obesity.

9. Increased Intra Ocular Pressure: Suxamethonium 1 mg/kg raises the pressure by 7mm Hg partly as a result of tonic contraction of the extra-ocular muscles with return of normal pressure in 10 min**.**

10. Increased intracranial pressure: A mean increase of 5 mm Hg over the baseline is observed. This may have serious consequences with intra-cranial compliance is limited.

MIDAZOLAM

Midazolam, an imidazobenzodiazepine derivative, has a molecular weight of 362. It has a fused imidazole ring which accounts for its basicity, stability of the aqueous solution and rapid metabolism. The drug was synthesized in 1976 by ***Fryer and Walser.***

The pka of midazolam is 6.15 which permits preparation of watersoluble salts. The parenteral preparation of the midazolam used in clinical practice is buffered to an acidic pH (3.5) in acidic aqueous media, midazolam is water soluble thereby allowing the parenteral formulation to exclude lipoidal substitutions like propylene glycol. As such midazolam does not cause local irritation after IM or IV use. At physiologic pH, midazolam becomes highly lipophilic and is one of the most lipid soluble of the benzodiazepines. The high lipophilicity has a

number of clinical consequences including rapid absorption of the drug from the GIT and rapid entry into brain tissue after IV administration.

PHARMACOKINETICS

Midazolam is bound extensively to the plasmaproteins in the range of 96-97%. The unique chemical structure of midazolam confers number of physiochemical properties that distinguish it from other benzodiazepine in terms of pharmacologic and pharmacokinetic characteristics.

Metabolism involves hydroxylation by hepatic microsomal oxidative mechanism. The fused imidazole ring is oxidized very rapidly by the liver.The principal metabolite is 1-hydroxy midazolam and smaller amounts of 4-hydroxymidazolam and 1,4 dihydroxymidazolam which are excreted in urine as glucuronide conjugates.

The high lipophilicity of midazolam at physiologic PH results in very rapid onset after IV administration. The volume of distribution is 1-2.5 lts/kg. Half life is 1-4 hrs. The volume of distribution increases greatly in obese patients because of the greatly enhanced distribution of midazolam into peripheral adipose tissues.

PHARMACODYNAMICS

Midazolam has the anxiolytic, hypnotic, anti convulsant, muscle relaxant and anterograde amnesic effects characteristic of benzodiazepines. It exerts its anxiolytic effect by increasing glycine inhibitory transmitter. The hypnotic effect is related to GABA accumulation .Anti convulsant activity is the enhanced action of GABA on the motor circuits of brain. It also exhibits muscle relaxant effect mediated via glycine receptors in spinal cord. Midazolam reduces cerebral metabolic rate for O2 and cerebral blood flow protecting against cerebral hypoxia in patients with raised ICP. Midazolam produces dose dependant respiratory depression and is more likely in patients premedicated with opiods. It produces significant reduction in BP, systolic 5% and diastolic 10% and increase in heart rate by 18%. A decrease in SVR ,venodilation and a transient change in portal bloodflow combine to reduce the cardiac filling. It also decreases myocardial contractility by direct action. A reduction in BP activates baroreceptors and increase the heart rate.

ADVERSE EFFECTS **:** are hiccups 5.6%, coughing 1.5% and nausea vomiting 3%. The behavioural and electrophysiological effects of midazolam are antagonized by benzodiazepine antagonist flumazenil.

USES :

It is used as an induction agent in a dose of 0.1 to 0.4mg/kg. Induction dose can be reduced in patients premedicated with opiods and in elderly pts.

It is a useful hypnotic, amnestic during maintenance of anesthesia along with fentanyl and nitrous oxide 66%.

It is used as premedicant due to its anxiolytic and hypnotic properties.

It is a useful intravenous adjuvant for local and regional anesthesia for a variety of therapeutic and diagnostic procedures.

AIM OF THE STUDY

The aim of the study is to observe the usefulness of Midazolam and mini-dose of Succinyl choline to facilitate the insertion of laryngeal mask airway during Propofol anesthesia in elective general surgery patients based on the following parameters.

- Conditions during insertion of laryngeal mask airway such as jaw relaxation, ease of insertion, number of attempts for insertion, airway trauma and total dose of Propofol.

- Patient's response to insertion of laryngeal mark airway such as gagging, coughing, head and limb movements, laryngospasm, etc.

- Hemodynamic parameters like mean arterial pressure, heart rate and oxygen saturation.

REVIEW OF LITERATURE

Tracheal intubation is performed routinely during general anaesthesia in patients undergoing surgery to secure a clear airway, to allow good surgical access and to facilitate ventilation of lungs for better control of $PaCO_2$ and PO_2. However intubation is associated with tachycardia, hypertension and an increase intraocular pressure. Various unsuccessful attempts were tried to attenuate the response upto this date.

The laryngeal mask airway was invented and developed by ***Dr.AI.J. Brain, a British Anaesthesiologist, at London Hospital in 1981.*** The use of a prototype was first described in 1983. Although a number of airway devices similar to laryngeal mask airway were described previously, none gained the popularity of the laryngeal mask airway.

It was ***Dr. Brain's*** belief that the two methods by which the anatomical airway was commonly connected to an artificial airway were less than ideal. The most elegant way to join the two involves an end-to-end junction at the glottis. The facemask falls short, because it forms the connection at the mouth and the nares and the endotracheal tube goes too far, penetrating the lumen of the respiratory tree.

Many published trials have demonstrated the superiority of the laryngeal mask airway over endotracheal tube.

Despite the popularity of LMA for airway maintenance during general anaesthesia, there is still no optimal induction technique that guarantees good insertion conditions while maintaining cardiovascular stability and rapid onset of respiration. There have been numerous papers that looked into coinduction techniques combining a low dose of propofol or thiopentone or with other agents, including benzodiazepines, rapidly acting opiates, neuromuscular blocking agents and topical or intravenous local anaesthetic agents.

HO KM, Chui PT, (1999) [23] – studied the use of minidose suxame -thonium to facilitate the insertion of laryngeal mask airway. They divided the patients into two groups. After administration of intravenous propofol 2.5mg/kg. Group I received 0.9% sodium chloride and group II received succinylcholine 0.1mg/kg. They concluded that minidose suxamethonium improved correct positioning of LMA in first attempt, decreased the incidence of swallowing, gagging and head and limb movements. LMA insertion was graded as easy in 93% of patients who had mini-dose suxamethonium, compared with 60% in Group I. The total dose of propofol needed to insert the LMA was lower is Group II

Yoshini A, HashimotoY, Hiroshima J, T. Hakoda et al (1999) [24] compared the effects of low doses of succinylcholine in facilitating easy insertion of LMA during thiopentone anaesthesia. They divided the patients into three groups, Group I is control group – received normal saline, Group II received succinylcholine 0.25mg/kg, and Group III received succinylcholine 0.5 mg/kg. All group of patients received thiopentone as the induction agent. They concluded that insertion condition was good in patients who received succinylcholine 0.5 mg/kg. They also stated that adverse effects like coughing, gagging are reduced in succinylcholine group. They detected significant difference between group 3 and group 2 in the duration of apnoea.

Christine JC Cheng, Sitaram Raman, Timothy, Chui Ping et al (2003)

Studied the effects of low dose succinylcholine for insertion of laryngeal mask airway following etomidate anaesthesia. They divided the patients into three groups. Group I received etomidate and normal saline, group II received etomidate and succinylcholine 0.25 mg/kg, Group III received succinylcholine 0.5mg/kg... In their study they stated that administration of succinylcholine increased the success rate of LMA insertion compared to the control group.

PTchui and E.M.W. Chearm [12] studied the use of low dose mivacurium to facilitate easy insertion of LMA following propofol induction. In their study, insertion was graded easy in 88% of patients who had received mivacurium compared to 50% of patients who received propofol alone. They concluded that low dose mivacurium facilitates laryngeal mask airway insertion and decreases the incidence of postoperative sore throat .

Yaddanapudi et al and his colleagues found that thiopentone 3-6mg/kg and suxamethonium 1.5mg/kg resulted in only one difficult insertion in 20 subjects. Based on these results, Yaddanapudi's group suggested that insertion of LMA under neuromuscular block was an viable alternative to insertion with propofol and might be considered when the requirements of surgery necessitates controlled ventilation.

Koh, Kwong Fah, Cheong, Kengfatt (1999) [25] studied laryngeal mask insertion conditions using thiopental and low dose atracurium: a comparison with propofol. 120 patients were divided into 4 groups. Group I received 1 μg / kg fentanyl + 2.5 mg/kg propofol,group-2-1μg/kgfentanyl+5mg/kg thiopentone group III – 1 μg/kg fentanyl + 5 mg/kg Thio+ 0.05 mg/kg atacurium,Group-4-1μg/kgfentanyl+5mg/kg thiopentone+0.1mg/kg atracurium. They concluded that the combination

of thiopental-fentanyl with low dose atracurium (0.05 or 0.1mg/kg) provided conditions comparable with those of propofol for laryngeal mask insertion.

Naguib M, Samakandi AH – Studied the efficacy of low dose of rocuronium to facilitate laryngeal mask airway insertion following propofol anaesthesia. They observed that LMA insertion was graded easy in 90.6% of patients who received rocuronium compared to 42% of patients who received propofol alone. They concluded that rocuronium improved the overall insertion conditions and the optimal dose needed appeared to be 100 micrograms / kg.

Wong Punkamol, Boon Song P, Paiboon et al compared the two anaesthetic techniques for laryngeal mask airway insertion. In their study 60 patients were randomly allocated to receive either propofol 2mg/kg or thiopentone 5mg/kg with succinylcholine 1.5mg/kg. They observed that mean insertion time was 8 sec and 5.5 sec respectively. 63% of patients in propofol group experienced undesirable responses during insertion, while no patients in the thiopentone and succinylcholine group had adverse effects.

Nimmo SM; MC Cann N; Broome I.J.; Robb H.M. et al (1995) [27] studied the effectiveness and sequlae of very low dose suxamethonium

for nasal intubation. Patients requiring nasal intubation were induced with propofol and alfentanil. 3 groups of 20 patients received nosuxa, suxa 0.25mg/kg, suxa 0.5mg/kg. All patients received i.v. Fentanyl and diclofenac 100mg rectally for analgesia. Good intubating condition were produced in all 20 patients receiving suxa 0.25mg/kg, in 19 patients receiving suxa 0.5mg/kg and 11 patients not receiving neuromuscular blocking agents. The incidence of postoperative myalgia after suxa 0.25mg/kg (20%) was not significant.

Chear EW, Chu PT [12] had done randomized double-blinded comparison of fentanyl, mivacurium or placebo to facilitate LMA insertion. The conclusion was fentanyl and mivacurium was equally effective in insertion of LMA following propofol anaesthesia.

Lee MP, Kua JA, Chin WK studied the use of remifentanyl for insertion of LMA. They concluded that remifentanyl 0.25 micrograms / kg when administrated after intravenous propofol 2.0mg/kg. provided excellent conditions for insertion of laryngeal mask airway with minimal hemodynamic disturbances.

Chiu CL, Wang CY, Chan YK et al (2005). In their study they evaluated the effectiveness on hemodynamics and insertion condition for laryngeal mask airway using ketamine – propofol, fentanyl – propofol

and propofol – saline. They concluded that the addition of ketamine 0.5mg/kg improves haemodynamics when compared to fentanyl 1µg/kg, with less prolonged apnoea and is associated with better LMA insertion.

Seavell CR, Cook TM et al (1996) [26] They assessed conditions for insertion of a laryngeal mask airway in patients who received either thiopentone 5mg/kg preceded by 40mg of topical lignocaine to the posterior pharyngeal wall or propofol 2.5mg/kg alone. They concluded that thiopentone preceded by topical lignocaine spray provided conditions for insertion of a LMA equal to those of propofol, with more hemodynamic stability and a shorter period of apnoea. Gagging, coughing and laryngospasm following LMA insertion were graded and hemodynamic data and apnoea times were recorded.

Bapat Pramod, Joshi Ravindra, Young Edward (1996) [19] assessed the ease of insertion of LMA with propofol versus thiopentone + midazolam / lidocaine. 150 patients were recruited into 3 groups. Anaesthetic induction was achieved with 1µg / kg Fentanyl i v followed by 2.5mg/kg – propofol – group P

1.5mg/kg lidocaine + 5mg/kg thiopentone GPLT

0.1mg/kg midazolam, 3mts later – 5mg/kg Thiopentone – GPMT

They concluded that Thiopentone –Midazolam combination provided conditions as comparable with those of propofol.

Ti Liankah, Chow mark Y.H., Lee Tat, Leang et al (1999) compared the insertion conditions following propofol 3mg/kg and sevoflurane 8% single VCB induction.

They concluded that single VCB induction with sevoflurane compares favorably with I.V. propofol induction for LMA insertion. However prolonged jaw tightness after the sevoflurane induction may delay LMA insertion.

Tagaito, Yugo, Isono, Shiroh, Nishino, Takashi et al, (1998) studied on upper airway reflexes during a combination of propofol and fentanyl anaesthesia. They concluded that vigorous airway reflexes are elicited by laryngeal stimulation in patients anaesthetized with propofol alone. Although in general, incremental doses of fentanyl depress the airway reflex response in a dose related manner, a small dose of fentanyl does not effectively prevent laryngospasm.

Brown GWL, Patel N, Ellis (1991) [9] compared the conditions for LMA insertion following induction with either thiopentone or propofol.

They concluded that thiopentone resulted in more incidence of gagging, coughing compared to propofol.

Scan Lon, Carey M, Power M, Kirby F (1993) [8] compared the patient response to LMA insertion following induction with thiopentone or propofol. They stated that thiopentone alone was associated with greater incidence of gagging, coughing and head and limb movements.

MATERIALS AND METHODS

After obtaining institutional ethical committee clearance and the patient consent, the study was carried out on 75 patients posted for elective surgical procedures lasting less than or equal to 45 min at Madras Medical College & GGH, Chennai.

Patients belonging to the age group of 18 – 50 years of both the sexes were selected.

Inclusion Criteria

- Elective short surgical procedures lasting less than or equal to 45 min Patients of ASA physical status I and II
- Aged between 18 – 50 years of both sexes.

Exclusion Criteria

- Patients with full stomach ,pregnant patient
- Patients posted for emergency surgery
- Patients with oral, peri oral pathology such as tumours, abscess or grossly enlarged tonsils

- Patients with fixed reduced pulmonary compliance such as pulmonary fibrosis, severe cardiovascular, hepatic or renal disease

Types of Surgeries

The various types of surface surgeries that were included in this study are shown in table

Type of Surgeries	**GroupA**	**GroupB**	**GroupC**	**TOTAL**
Fibroadenoma Excision	6	5	8	19
Lipoma Excision	4	4	3	11
Hydrocele – Excision and Eversion	2	2	3	7
Hernioraphy	3	2	2	7
Ganglion excision	3	2	1	6
Gynaecomastia – Webster's Procedure	1	1	1	3
Haemorrhoids,fissure in ano	3	3	3	9
Other minor surgeries	3	6	4	13

PATIENT PREPARATION: All patients were advised overnight fasting

PRE-LOADING: All patients are preloaded with 10ml/kg of balanced salt solution.

PRE MEDICATION: All patients were premedicated with

Inj. Glycopyrrolate 4mcg/kg i.v

Inj.fentanyl 2mcg/kg

MONITORS USED: Non invasive Blood Pressure (NIBP)**,** Electrocardiogram (ECG)**,** Pulse oximetry.

METHODOLOGY

All patients were randomly grouped under 3 groups viz., Group A propofol only, Group B propofol with midazolam, Group C propofol with succinylcholine .

All patients are pre oxygenated with 100% O2 for 3 min. All patients are then induced with propofol bolus until the endpoint of loss of eye lash reflex is obtained.Then in group C alone 0.1mg/kg succinyl choline is injected . We wait for 60 sec for fasciculations if any and proceed with LMA insertion. . Patients were then maintained on assisted

ventilation with 100% oxygen over a period of 60 secs.. After 60 sec, well-lubricated LMA was inserted by the standard techniques described in the intravent manual[29]. During insertion of laryngeal mask airway jaw relaxation, gagging / coughing, heads& limb movements, presence or absence of laryngospasm were noted. If jaw relaxation was found to be inadequate to permit LMA insertion, boluses of propofol were given until adequate jaw relaxation occurred.

Jaw Relaxation : Was graded by ***Young, Clark, Dundee*** [55]

Adequate - Adequate jaw relaxation with LMA insertion done without any difficulty

Incomplete - Inadequate Jaw relaxation but LMA insertion is possible with difficulty

Poor - Inadequate jaw relaxation and LMA insertion is not possible

Overall Insertion Conditions : Was graded by ***Lund and Stovner*** [56]

Excellent - (Insertion – easy, no reaction from the patient)

Good - (Insertion results in slight cough or movements)

Poor - (Insertion possible but with marked patient response)

Un acceptable

Gagging or Coughing on Insertion : Was graded as

Present or absent

Head and Limb Movements : Was graded as

present or absent

After insertion of LMA, Cuff was inflated with appropriate volume of air and connected to the breathing circuit. Correct positioning of the LMA was verified by bilateral chest expansion, bilateral air entry by auscultation, capnography and the absence of leak around the cuff. The Ventilation was assisted with bag until resumption of spontaneous respiration. Anaesthesia was maintained with oxygen (2lt/ min), Nitrous oxide (4l/ min) and Halothane (1-2%). The hemodynamics were monitored before premedication, 1 minute prior to induction, 30 sec after induction and 1 minute after LMA insertion and throughout the procedure. At the end of surgery all the anaesthetic agents were discontinued and 100% oxygen administered. LMA was removed after the patient had gained adequate level of consciousness and after adequate return of pharyngeal reflexes. After removal of LMA, the patient was

observed for any spasm, coughing, vomiting. In the postoperative period, the patients were observed in the ward for 24 hours.

STATISTICAL ANALYSIS USING STUDENT T TEST

The t-test assesses whether the means of two groups are statistically different from each other. The t-value will be positive if the first mean is larger than the second and negative if it is smaller. Once we compute the t-value we look it up in a table of significance to test whether the ratio is large enough to say that the difference between the groups is not likely to have been a chance finding.

OBSERVATIONS AND RESULTS

This study was conducted on 75 patients who were divided into 3 groups of 25 patients each.

Group A - Propofol Group

Group B - Propofol with midazolam group

Group C - Propofol with succinyl choline group

Demographic Profile

In group A and C, 48% of patients are males and rest 52% are females, while in group B 52% of patients are males and rest females. The mean age of patient is 30.52, 30.12 and 30.84 in groups A, B and C respectively. The mean weight is 51.8, 53 and 53.22 in groups A, B and C respectively. Patients in each group were statistically comparable in relation to sex, age and weight. See Fig-2 & 3.

Comparison of conditions for LMA insertion

Jaw relaxation, overall insertion conditions and number of attempts for LMA insertion were observed and the results were tabulated as follows. Also see figure 4

Jaw Relaxation	Group A	Group B	Group C
Adequate	8	25	16
Incomplete	17	0	9
Poor	0	0	0

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Adequate	**3**	**16.33**	**8.505**	**4.910**
Incomplete	3	8.67	8.505	4.910

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Adequate	3.326	2	.080	16.333	-4.79	37.46
Incomplete	1.765	2	.220	8.667	-12.46	29.79

Jaw relaxation was more in group B compared to groups A or C, and the results are statistically significant as shown in tables above.

Overall Ease Of Insertion

The overall ease of insertion is graded as excellent, good, poor or unacceptable. The overall ease of insertion is excellent in 32% of group A patients, while it is 100% in group B and 44% in group C . See Fig.5.

Ease of insertion	Group A	Group B	Group C
Excellent	8	25	11
Good	17	0	14
Poor	0	0	0

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Excellent	3	14.67	9.074	5.239
Good	3	10.33	9.074	5.239
Poor	3	.00	.000(a)	.000

a t cannot be computed because the standard deviation is 0.

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Excellent	2.800	2	.107	14.667	-7.87	37.21
Good	1.972	2	.187	10.333	-12.21	32.87

The overall insertion conditions are excellent in Group B (Propofol with Midazolam) compared to the other groups and this is statistically significant as shown above.

NUMBER OF ATTEMPTS FOR SUCCESSFUL INSERTION OF LMA

In 100% of patients in group B , LMA was inserted in the first attempt, while in only 40 % and 64% of patients in groups A and C respectively LMA was inserted in the first attempt. This is represented as the following data. See Fig.6.

Attempts	Group A	Group B	Group C
First attempt	10	25	16
Second attempt	15	0	9

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
FirstAttempt	3	17.00	7.550	4.359
SecondAttempt	3	8.00	7.550	4.359

One-Sample Test

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
First Attempt	3.900	2	.060	17.000	-1.75	35.75
Second Attempt	1.835	2	.208	8.000	-10.75	26.75

100% of LMA insertions in Group B was done in the first attempt while Only 40% and 64% of LMA insertions were done in the first attempt in Groups A and C respectively, this is statistically significant as shown above.

COMPARISON OF PATIENT RESPONSE TO LMA INSERTION

Patient movement, gagging ,coughing, laryngospasm during LMA insertion were compared between the 3 groups. See Fig.7.

Patient Movement

Pt moving	Group A	Group B	Group C
YES	12	0	3
NO	13	25	22

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Yes	3	5.00	6.245	3.606
No	3	20.00	6.245	3.606

One-Sample Test

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Yes	1.387	2	.300	5.000	-10.51	20.51
No	5.547	2	.031	20.000	4.49	35.51

There was no patient movement in all patients of group B, whereas there was movement in 48% of patients in group A and 12% of patients in group C, which is statistically very significant. Additional doses of propofol was used for those patients.

Laryngospasm

	GROUPA	GROUP B	GROUP C
YES	0	0	0
NO	25	25	25

In both the groups, there was no incidence of laryngospasm. Likewise there was no gagging or coughing in all 3 groups.

Total dose of propofol (mg/kg) required for LMA insertion

	Group A	Group B	Group C
Total Propofol dose(mg/kg)	2.76	2.06	2.60

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
Dose	3	2.4733	.36679	.21177

One-Sample Test

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Dose	11.680	2	.007	2.47333	1.5622	3.3845

The mean total doses of propofol used are 2.76, 2.06, and 2.60 respectively in groups A, B, C. Group-B patients required lesser dose of propofol than Group A&C patients which is also statistically significant.

Airway Trauma

Airway trauma	Group A	Group B	Group C
Yes	9	0	9
No	16	25	17

Also see fig. 8

One-Sample Statistics

Airway trauma	N	Mean	Std. Deviation	Std. Error Mean
Yes	3	5.67	4.933	2.848
No	3	19.33	4.933	2.848

One-Sample Test

Airway trauma	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
YEs	1.990	2	.185	5.667	-6.59	17.92
TNo	6.788	2	.021	19.333	7.08	31.59

The incidence of airway trauma as witnessed by blood staining of LMA is 36% in group A and 32% in group C, while none of group B had any, which is statistically significant

HEMODYNAMIC CHANGES -PULSE RATE AND MAP

The mean variability in heart rate (heart rate pre op minus heart rate 1min Post insertion) is least in group B which is statistically significant. The pictoral representation of the mean variability in heart rate (pre op heart rate minus 1min post insertion heart rate) is as follows. Also see Fig.9&10

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
HR	3	19.28	2.383	1.376

One-Sample Test

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
HR	14.014	2	.005	19.280	13.36	25.20

The mean variability in mean arterial pressure (pre op MAP minus 1min post insertion MAP) is least in case of group B patients than groups A or C, which is statistically significant. There is no change in saturation (SPO2) levels either preop, post induction or post insertion between the 3 groups.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
MAP	3	21.28	1.698	.980

One-Sample Test

	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
MAP	21.713	2	.002	21.280	17.06	25.50

DISCUSSION

Adverse responses to insertion of laryngeal mask airway such as gagging, coughing and laryngospasm, may make correct positioning difficult or even impossible. So LMA insertion requires suppression of upper airway reflexes. Although Propofol obtunds the upper airway reflexes***, Stoneham, Bree and sneyd*** reported that easy insertion of the LMA was seen in only approximately 62% of patients with Propofol anaesthesia[10], which means that the sole use of Propofol does not always guarantee successful insertion of LMA comparisons have been made between various muscles relaxants in the LMA insertion.

Wafaa Taha Salem, Dept of Anesthesiology, National Cancer Institute, Cairo University investigated the use of Midazolam or mini dose Succinyl choline as a co induction agent with Propofol to facilitate LMA Insertion in 60 patients undergoing urological procedures. The patients were Divided into 3 groups ; Propofol group(P) receiving 2.5mg/kg Propofol for Induction, while group PM received 0.04 mg/kg Midazolam 3 min pre induction and group PS received 0.1mg/kg succinyl choline 30sec after propofol. The number of insertion attempts, total dose of Propofol, jaw relaxation, gagging, coughing, patient movement, laryngospasm, overall insertion conditions and hemodynamic changes

were recorded. Significant reduction in induction dose of propofol was noted in PM group(40%).The success rate at first attempt was 60%, 95% and 90% in P, PM and PS group respectively. The overall insertion conditions was excellent in 20%, 75% and 50% respectively in the 3 groups. Group PM showed less hemodynamic change. The incidence of fasciculation and myalgia was 20% in group PS. The study showed that Midazolam had the advantage of reducing the dose of propofol and producing hemodynamic stability.

In our study also, the total dose of Propofol was low by 25% in group B compared to group A,the ease of insertion was graded excellent in 100% of patients in group B compared to 32% and 44% in groups A and C respectively. Jaw relaxation was adequate in all patients of group B while it was only 32% and 64% in groups A and C respectively.LMA was inserted in first attempt in all group B cases while in 40% and 64% of group A and C, it was inserted in first attempt. Also group B patients were more hemodynamically stable than the rest of the patients. Hence it is concluded that Midazolam aids LMA insertion in Propofol anesthesia for LMA insertion.

A randomized, double blind, placebo control study conducted at ***Maisonneuve-Rosemont Hospital*** in july,2008 investigated the effects of fentanyl-midazolam premedication during sevoflurane anesthesia for proseal LMA insertion in adult elective surgery patients. Two groups of 40 patients each were given either NaCl(placebo) or fentanyl0.6 mcg/kg+ midazolam 9 mcg/kg 5 min before tidal volume sevoflurane 8% induction with 6 L/ min O2. Hemodynamics at end of induction and 1min, 5min post insertion were recorded and plotted against pre op values. The number of insertion attempts,jaw relaxation, gagging, coughing, patient movement, laryngospasm,overall linsertion conditions were recorded. It was found that fentanyl-midazolam group had stable hemodynamics, 95% first attempt insertion rate compared to 72% in placebo group and excellent insertion conditions with no gagging, coughing, movement or laryngospasm compared to placebo group.

In our study, fentanyl is common to all 3 groups. In group B (Midazolam) the jaw relaxation and overall ease of insertion were far better (100% in group B to 32% and 64% in groups A and C respectively.)The number of cases in which LMA was inserted in first attempt was also 100% compared to 40% and 64% respectively in groups

A and C. Hemodynamics were also stable in group B compared to groups A and C.

A prospective, randomized, double-blind, controlled study was conducted in 60 ASA 1,2 subjects. Normal saline, ketamine 0.5mg/kg, midazolam 0.05mg/kg were administered in groups P(propofol), PK (propofol-ketamine) and PM (propofol –midazolam), respectively 2 min prior to the administration of the induction dose of propofol. Propofol 3.5mg/kg (group P) or 2.5mg/kg (groups PK and PM) was used for induction, LMA inserted 30sec later and insertion conditions assessed. Heart rate and blood pressure were recorded immediately after propofol bolus, then every min till 2min after LMA insertion. In group P ,systolic blood pressure (SBP) showed a significantly greater decrease compared to group PK and PM .Only 5% of patients in group PK and PM showed > 20% fall in SBP compared to 89% in group P .

In our study also group B (midazolam group) patients were more hemodynamically stable than the rest of the patients. Hence it is concluded that midazolam aids LMA insertion in propofol anesthesia for LMA insertion.

Hokm and PT Chui studied the use of minidose succinyl choline for LMA insertion. They concluded that suxamethonium improved

correct positioning and insertion in first attempt. They also observed that the total dose of propofol needed to insert LMA was lower in succinylcholine group and was associated with less hypotension

In our study also, in 64% of cases in group C LMA was inserted in the first attempt which is more than in group A(40%) but less than in group B (100%). Also only 2.60 mg/kg of propofol was needed in group C compared to 2.76mg/kg in A group,(although it is only 2.06mg/kg in group B).

Cook TM, Seavel et al, compared topical and intravenous lignocaine to aid insertion of LMA with thiopentone. The group who had lignocaine topical had a lower incidence of laryngospasm.

In the present study there was no incidence of laryngospasm in both the groups

SUMMARY

In this study, the conditions of LMA insertion, patient's response to LMA insertion and the hemodynamic changes during and after LMA insertion in the following three groups of patients were observed.

Group A - Inj. Propofol 2.5mg/kg only

Group B - Inj. Propofol 2.5 mg/kg + 0.04mg/kg midazolam

Group C- Inj. Propofol 2.5 mg/kg + 0.1 mg/kg succinyl choline

- The jaw relaxation was adequate in 100% of group B patients compared to 32 % of patients in group A and 64% in group C.
- Overall insertion conditions were excellent in 100% of patients in Group B compared to 32% in Group A and 44% in group C.
- LMA was inserted successfully in the first attempt in 100% of patients in Group A compared to 40% in Group A and 64% in group C.
- Airway trauma as evidenced by blood staining of LMA was found in 36% of patients in group A and 32% in group C while none of the patients in group B had any airway trauma.

- Post op myalgia was present in 40% of patients in group C.
- Patient movements were present in 48% of patients in Group A compared to 12% in Group C while no movement was present in any of the patient in group B
- The total dose of Propofol required for successful insertion of LMA was 2.76mg/kg in Group A and 2.60 mg/kg in Group C,while it is the least 2.06mg/kg in group B which is the cause of significant hemodynamic stability in patients of group B

CONCLUSION

To conclude, addition of Midazolam (0.04mg/kg) to the standard dose of propofol provides better LMA insertion conditions than the addition of mini-dose Succinyl Choline (0.1mg/kg).

FIG-10

HEMODYNAMIC CHANGES-MAP

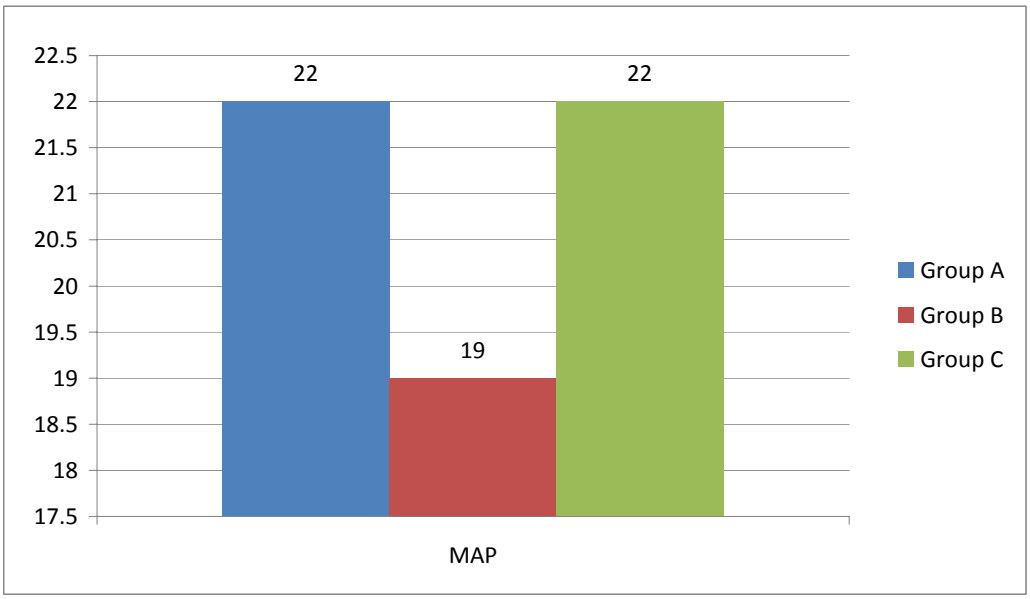


FIG-9
HEMODYNAMIC CHANGES- HEART RATE

FIG-8
AIRWAY TRAUMA

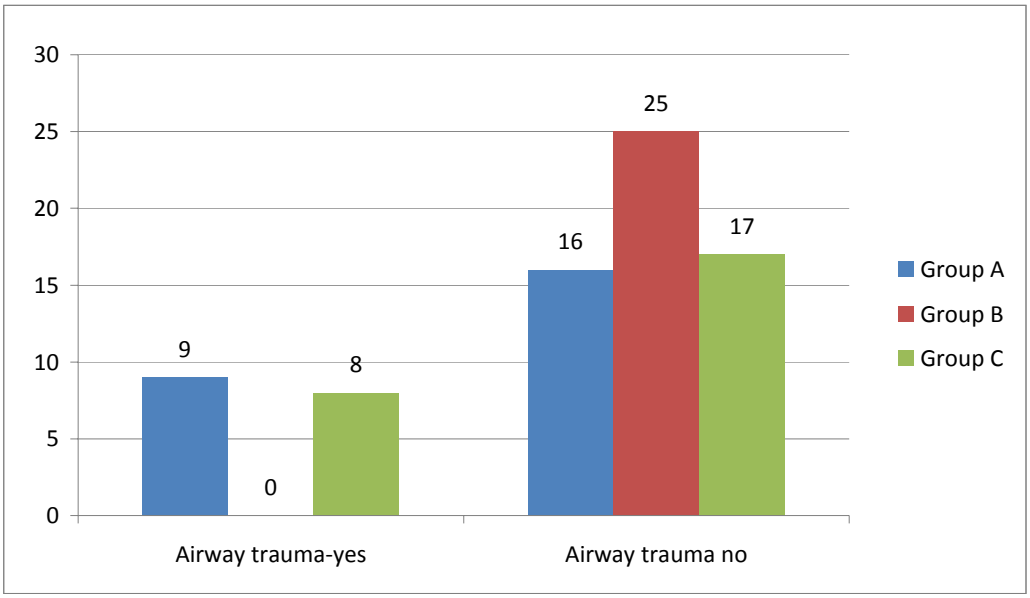


FIG-7
PATIENT MOVEMENT

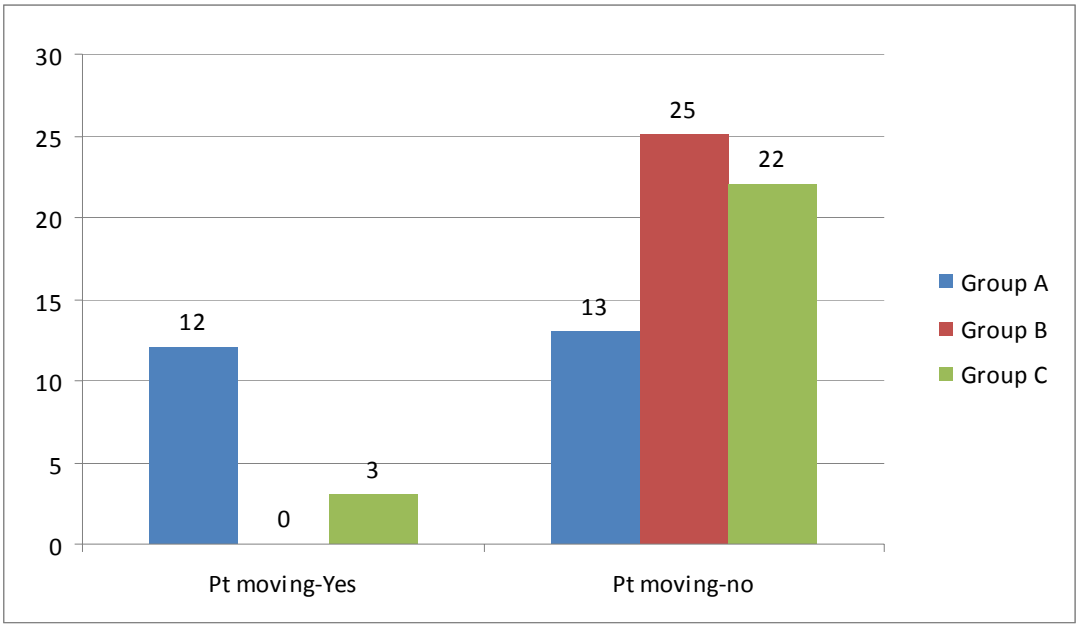


FIG-6
NUMBER OF ATTEMPTS

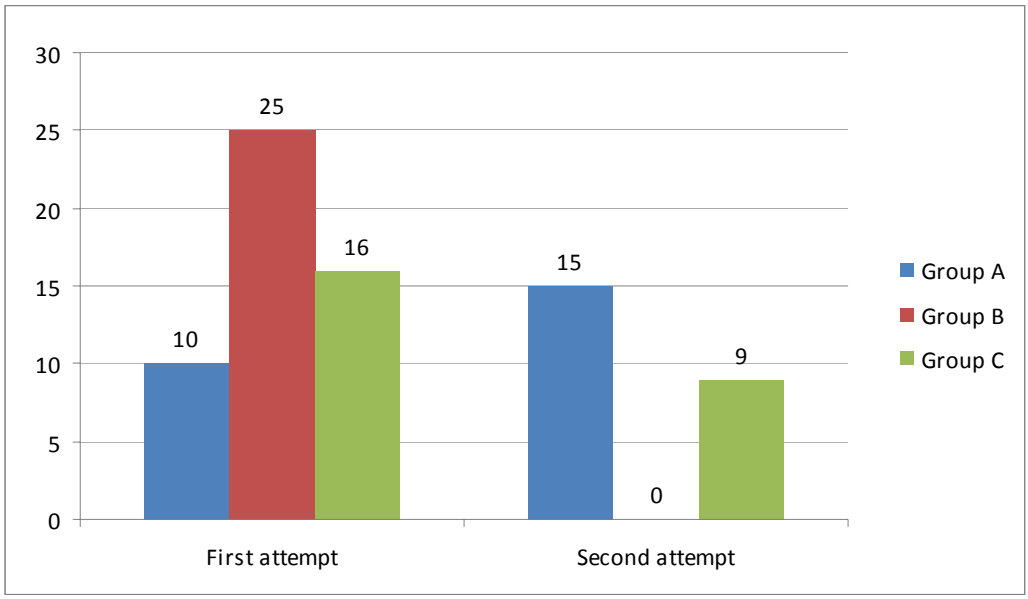


FIG-5

OVERALL EASE OF INSERTION

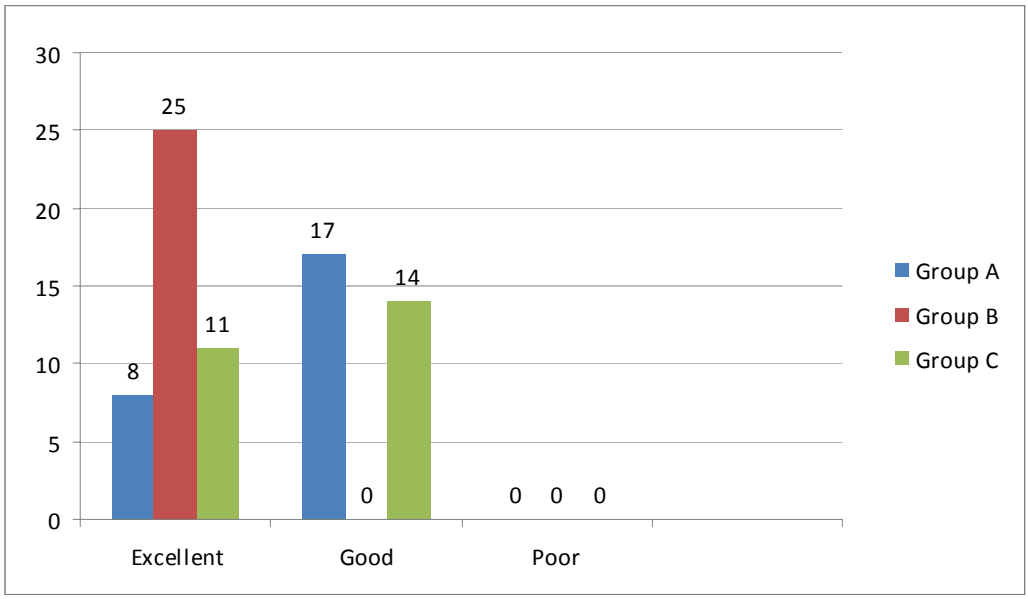


FIG-4

JAW RELAXATION

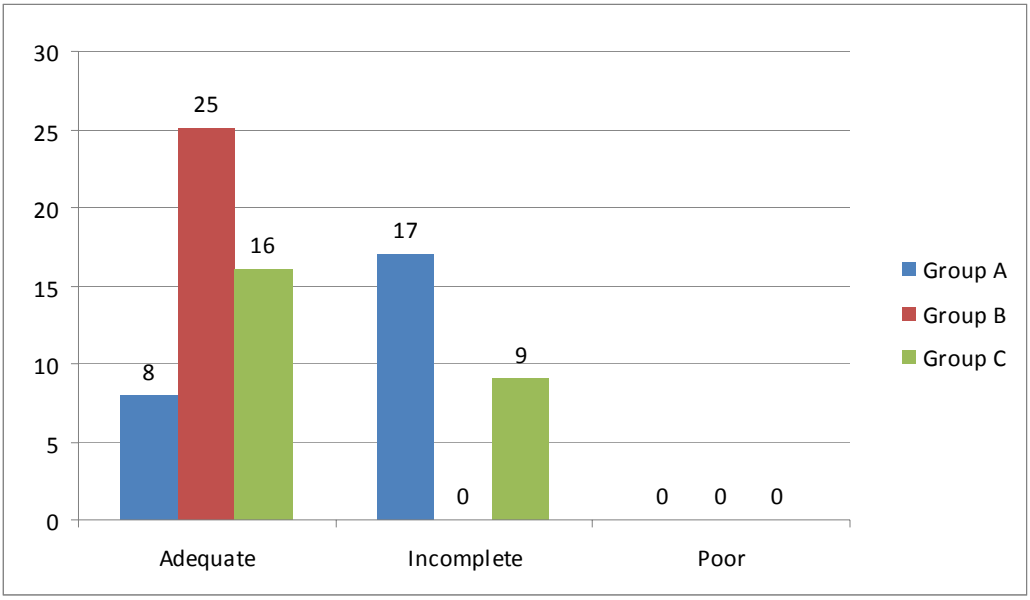


FIG –2

SEX DISTRIBUTION

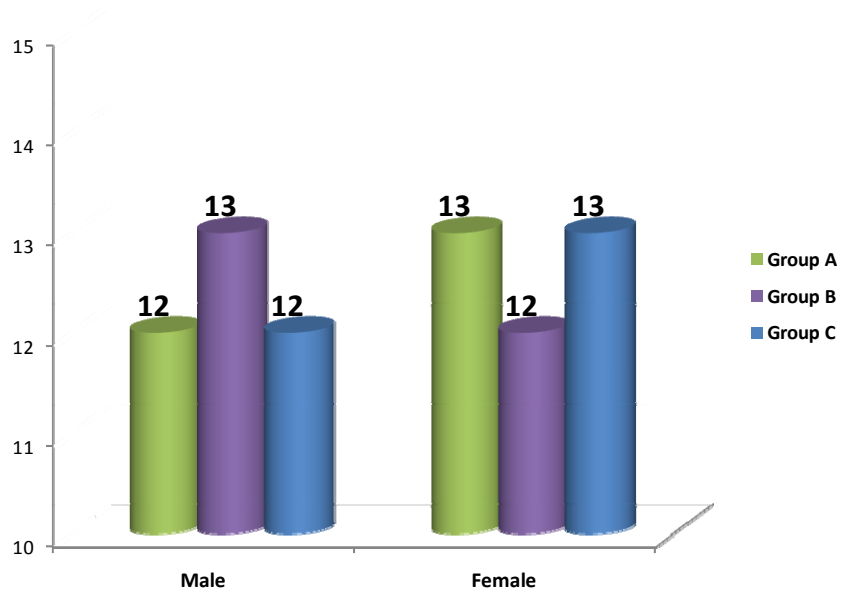


FIG-3

AGE AND WEIGHT DISTRIBUTION

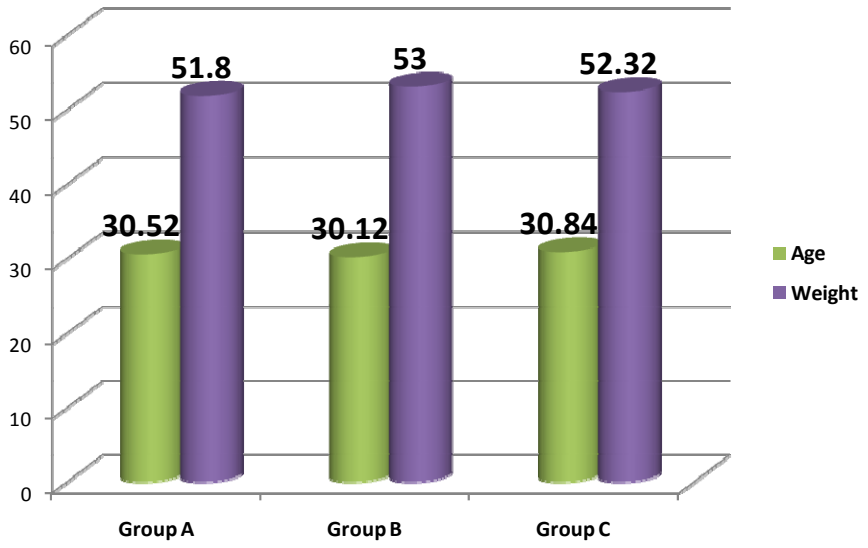
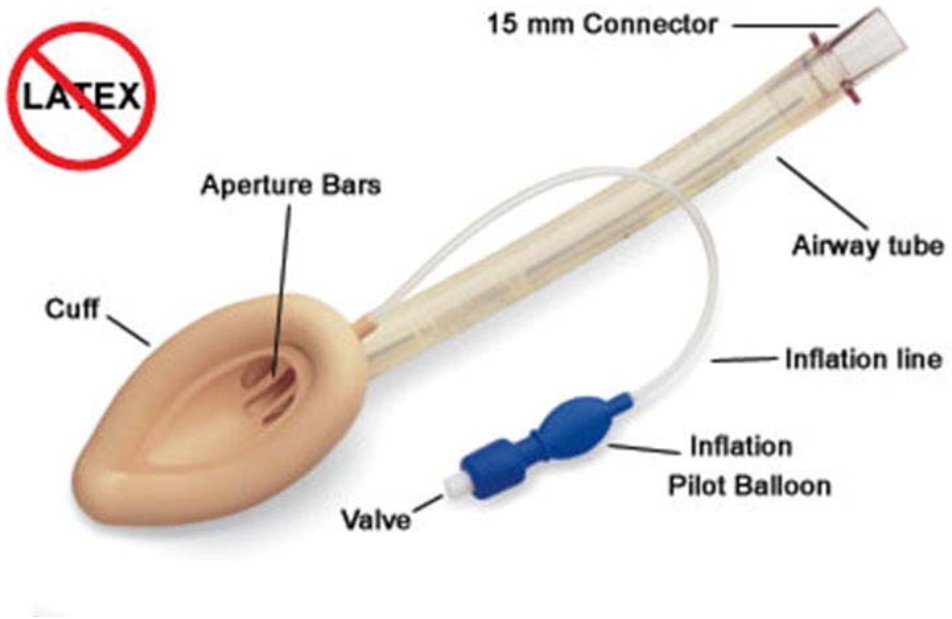


FIG 1
CLASSICAL LMA



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PROFORMA

Name:
Age : Sex : IPno: wt(Kgs):
Diagnosis:
Plan: Group :
Preop assessment :
History of any comorbid illness or allergy:
_____
_____

BP: CVS:
PR: RS:
SPO_2

Premed:	inj.glyco 4 microgram/kg	fentanyl 2microgram/kg
Dose :	_____	_____
	Inj.midaz(if applicable) 0.04 mg/kg	inj succinylcholine (if applicable) 0.1mg/kg
Dose :	_____	_____

Propofol: Induction ----------(2.5mg/kg)

Supplemental dose ---------(0.25mg/kg) once in 15 sec

---------(0.25mg/kg)

---------(0.25mg/kg)

Total dose ---------mgs(-------- in mg/kg)

OUTCOME MEASURES (tick appropriate)

		Yes	No
1.	Gagging		
2.	Coughing		
3.	Patient movement		
4.	Laryngospasm		

		Adequate	Incomplete	Poor
5.	Jaw relaxation			

		Excellent	Good	Poor	Unacceptable
6.	Overall insertion ease				

SECONDARY OUTCOME MEASURES

1. Number of attempts
2. Duration of insertion (from induction to conformation of placement)
3. Airway trauma (blood staining of LMA) yes/no

		Pre op	Post induction	Post insertion 1.min	Post insertion 5.min
4.	BP Sys				
	Dias				
5.	PR				
6.	Spo_2				

DATE:

TIME:

THEATRE:

SIGNATURE OF GUIDE SIGNATURE OF STUDENT

MASTER CHART

S. No	Age	SEX	IP.No	SURGERY	Wt (Kgs)	GROUP	GAGGING	COUGHING	PATIENT MOVEMENTS	LARYNGO SPASM	JAW RELAXATION	EASE OF INSERTION	TOTAL PROPOFOL (mg/kg)	No Of ATTEMPT	AIRWAY TRAUMA	HEART RATE\Min		
																PRE OP(1)	POST INDUCTION (2)	POST INSERTION(1min)(3)
1	15	M	32116	R Herniography	53	A	NO	NO	YES	NO	Incomplete	Good	3.00	2	NO	102	90	80
2	30	F	28114	L Fibroadenoma Excision	48	A	NO	NO	YES	NO	Incomplete	Good	3.00	2	YES	98	82	74
3	34	M	29118	L Eversion Of Sac	64	A	NO	NO	YES	NO	Incomplete	Good	3.00	2	YES	102	84	80
4	22	M	21443	Circumscicion	55	A	NO	NO	YES	NO	Adequate	Excellent	2.75	2	NO	100	90	84
5	24	F	31446	R Fibroadenoma Excision	49	A	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	98	88	80
6	48	F	11916	Hemorrhoidectomy	62	A	NO	NO	YES	NO	Incomplete	Good	2.75	2	YES	98	84	80
7	17	M	31094	R websters	50	A	NO	NO	YES	NO	Incomplete	Good	3.00	2	NO	92	74	70
8	19	F	31001	L Fibroadenoma Excision	44	A	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	90	72	70
9	37	F	29142	L Cervical Node Biopsy	51	A	NO	NO	NO	NO	Adequate	Excellent	2.50	1	YES	94	84	80
10	46	M	19442	L Varicocelectomy	4O	A	NO	NO	NO	NO	Incomplete	Good	2.75	2	NO	98	82	80
11	23	M	28414	Lipoma L thigh excision	52	A	NO	NO	YES	NO	Incomplete	Good	2.75	1	NO	94	94	68
12	18	F	31098	Ganglion R Hand	42	A	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	98	84	80
13	36	M	31719	Lat Spincterotomy	64	A	NO	NO	NO	NO	Adequate	Excellent	2.50	1	YES	94	80	74
14	29	F	32408	Fibroma R Thigh	56	A	NO	NO	NO	NO	Adequate	Excellent	2.50	2	NO	104	88	82
15	30	M	32499	L Hernioraphy	50	A	NO	NO	NO	NO	Incomplete	Good	2.75	2	NO	98	90	84
16	41	M	91426	Lipoma Axilla Excision	46	A	NO	NO	YES	NO	Incomplete	Good	3.00	2	YES	94	90	74
17	16	M	38904	L Ant Chestwall Lip Excision	50	A	NO	NO	NO	NO	Incomplete	Good	2.75	2	NO	100	90	74
18	20	F	38094	R Fibroadenoma Excision	52	A	NO	NO	YES	NO	Incomplete	Good	2.75	1	NO	98	90	72
19	32	M	31168	L Hernioraphy	62	A	NO	NO	NO	NO	Incomplete	Good	2.50	2	YES	108	92	82
20	42	F	41913	Sec Suturing	56	A	NO	NO	YES	NO	Incomplete	Good	2.75	1	NO	98	78	64
21	47	F	31816	Ganglion L Hand Excision	58	A	NO	NO	NO	NO	Adequate	Excellent	2.50	2	NO	94	84	80
22	26	F	31411	L Fibroadenoma Excision	60	A	NO	NO	YES	NO	Incomplete	Good	3.00	2	NO	100	84	70
23	27	F	32410	Lat Sphincterotomy	61	A	NO	NO	NO	NO	Incomplete	Good	3.00	2	YES	98	88	80
24	45	M	41901	L Eversion Of Sac	53	A	NO	NO	YES	NO	Incomplete	Good	3.50	1	YES	98	80	64
25	39	F	38104	L Phylloids Excision	57	A	NO	NO	NO	NO	Incomplete	Good	2.50	1	NO	100	90	72
26	39	M	30517	Lat Sphincterotomy	62	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	92	88	82
27	17	F	30846	R Fibroadenoma Excision	45	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	100	92	90
28	50	F	26899	Sinus tract Exploration	50	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	88	80	74
29	28	F	27872	R Fibroadenoma Excision	50	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	102	90	84
30	19	M	31194	L Websters	55	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	92	82	70
31	44	M	32132	Lipoma Excision	65	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	110	92	82
32	18	M	32779	R websters	45	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	94	88	82
33	16	M	33512	L Herniotomy	35	B	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	94	82	62
34	27	M	23416	R Thigh Fibroma Excision	53	B	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	99	86	80
35	36	M	21416	Lat Sphincterotomy	60	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	106	94	90
36	32	M	23937	Hemorrhoidectomy	44	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	94	82	84
37	22	M	21499	L Eversion Of Sac	50	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	96	90	80
38	26	M	33719	L Eversion Of Sac	65	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	92	84	68
39	42	F	28255	L Fibroadenoma Excision	58	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	108	92	90
40	21	F	36438	L Fibroadenoma Excision	50	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	110	103	97
41	23	F	26119	Ganglion Excision	60	B	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	96	90	80
42	26	M	26318	Varicocelectomy	56	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	98	80	72

S. No	Age	SEX	IP.No	SURGERY	Wt (Kgs)	GROUP	GAGGING	COUGHING	PATIENT MOVEMENTS	LARYNGO SPASM	JAW RELAXATION	EASE OF INSERTION	TOTAL PROPOFOL (mg/kg)	No Of ATTEMPT	AIRWAY TRAUMA	HEART RATE\Min		
43	48	F	28807	L Fibroadenoma Excision	65	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	92	82	80
44	37	F	21441	Lipoma Excision Chestwall	55	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	100	92	80
45	34	F	23493	Naevus Face Excision	52	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	89	70	64
46	42	M	26443	R Dermoid Excision	48	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	96	88	84
47	31	F	27431	Tatoo Chest Excision	57	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	93	80	73
48	42	M	21916	R Hernioraphy	60	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	94	80	80
49	16	F	23415	Lypoma R Thigh Excision	40	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	98	88	80
50	17	F	22119	Sural Nerve Biopsy	45	B	NO	NO	NO	NO	Adequate	Excellent	2.00	1	NO	102	94	90
51	38	F	30790	Lump Breast Excision	68	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	120	104	98
52	18	F	30824	L Fibroadenoma Excision	45	C	NO	NO	NO	NO	Adequate	Good	2.75	2	NO	104	86	80
53	32	M	33232	R Eversion Of Sac	60	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	95	82	76
54	19	F	36077	L Axilla Lipoma	48	C	NO	NO	YES	NO	Incomplete	Good	2.75	2	YES	102	92	80
55	49	F	32359	R Phylloids Excision	45	C	NO	NO	NO	NO	Incomplete	Good	2.50	1	NO	89	76	62
56	16	M	31414	Cervical Node Biopsy	45	C	NO	NO	NO	NO	Incomplete	Good	2.50	1	YES	100	96	90
57	38	M	36083	L Hernioraphy	52	C	NO	NO	NO	NO	Incomplete	Good	2.50	1	YES	80	76	74
58	43	F	32310	RBr Lump Excision Bx	55	C	NO	NO	NO	NO	Incomplete	Good	2.50	1	YES	92	86	80
59	29	F	34290	R Fibroadenoma	40	C	NO	NO	NO	NO	Adequate	Good	2.75	2	YES	88	80	78
60	25	F	34453	L Firoadenoma Excision	41	C	NO	NO	NO	NO	Adequate	Good	3.00	2	YES	98	92	82
61	35	M	34448	L Eversion Of Sac	64	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	86	68	66
62	44	M	34435	Hemorrhoidectomy	55	C	NO	NO	NO	NO	Adequate	Good	2.50	1	YES	87	78	74
63	28	F	34530	R Fibroadenoma Excision	62	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	98	90	88
64	42	M	34919	R Hernioraphy	56	C	NO	NO	YES	NO	Incomplete	Good	2.75	2	NO	94	90	80
65	32	F	34937	L Chestwall Lipoma Excision	50	C	NO	NO	NO	NO	Incomplete	Good	2.50	1	NO	96	92	80
66	37	F	34922	Ganglion Excision	48	C	NO	NO	YES	NO	Incomplete	Good	2.75	2	YES	102	88	82
67	34	F	33914	Fibroma R Thigh Excision	54	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	94	80	70
68	41	F	32814	Sinus R Ing Region Excision	52	C	NO	NO	NO	NO	Incomplete	Good	2.75	2	NO	98	88	76
69	46	M	30041	L Eversion Of Sac	60	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	104	90	84
70	17	F	31100	R Firoadenoma Excision	48	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	96	84	74
71	16	M	39403	Lat Sphincterotomy	49	C	NO	NO	NO	NO	Adequate	Excellent	2.75	2	NO	90	78	74
72	19	M	38406	Sec Suturing region	52	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	98	84	82
73	22	M	38411	Lipoma Excision	55	C	NO	NO	NO	NO	Adequate	Good	2.75	2	NO	94	82	74
74	24	M	37618	Sinus Exploration R Ing	50	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	100	92	88
75	27	M	31435	L Webster Operation	54	C	NO	NO	NO	NO	Adequate	Excellent	2.50	1	NO	98	82	78

HEART RATE\ Min2	MAP			MAP	SATURATION			SATU-RATION
(1-3)	PRE OP(1)	POST INDUCTION (2)	POST INSERTION(1min)(3)	(1-3)	PRE OP(1)	POST INDUCTION (2)	POST INSERTION(1min)(3)	(1-3)
22	96	81	74	22	100	100	100	0
24	92	80	72	20	100	100	100	0
22	100	78	74	26	100	100	100	0
16	98	84	80	18	100	100	100	0
18	92	78	72	20	100	100	100	0
18	102	90	82	20	100	100	100	0
22	94	88	78	16	100	100	100	0
20	101	90	84	17	100	100	100	0
14	98	90	81	17	100	100	100	0
18	100	88	76	24	100	100	100	0
26	98	74	70	28	100	100	100	0
18	100	90	78	22	100	100	100	0
20	98	84	80	18	100	100	100	0
22	101	91	80	21	100	100	100	0
14	102	90	78	24	100	100	100	0
20	92	80	74	18	100	100	100	0
26	98	78	74	24	100	100	100	0
26	94	80	78	16	100	100	100	0
26	101	88	84	17	100	100	100	0
34	92	80	68	24	100	100	100	0
14	90	72	70	20	100	100	100	0
30	98	72	68	30	100	100	100	0
18	98	70	60	38	100	100	100	0
34	100	72	68	32	100	100	100	0
28	98	78	74	24	100	100	100	0
10	99	83	72	27	100	100	100	0
10	90	64	65	25	100	100	100	0
14	96	78	75	21	100	100	100	0
18	83	71	70	13	100	100	100	0
22	94	82	73	21	100	100	100	0
28	105	75	71	34	100	100	100	0
12	91	71	74	17	100	100	100	0
32	90	74	71	29	100	100	100	0
19	102	90	85	17	100	100	100	0
16	106	92	88	18	100	100	100	0
10	92	80	72	20	100	100	100	0
16	90	81	76	14	100	100	100	0
24	96	85	72	24	100	100	100	0
18	100	89	85	15	100	100	100	0
13	93	65	68	25	100	100	100	0
16	90	82	76	14	100	100	100	0
26	90	80	72	18	100	100	100	0

HEART RATE\ Min2	MAP			MAP	SATURATION			SATU-RATION
12	84	70	73	11	100	100	100	0
20	90	72	72	18	100	100	100	0
25	96	78	68	28	100	100	100	0
14	90	81	77	13	100	100	100	0
20	92	80	76	16	100	100	100	0
14	92	80	78	14	100	100	100	0
18	90	82	72	18	100	100	100	0
12	93	81	80	13	100	100	100	0
22	108	96	86	22	100	100	100	0
24	96	80	76	20	100	100	100	0
19	110	85	73	37	100	100	100	0
22	100	76	70	30	100	100	100	0
27	96	85	67	29	100	100	100	0
10	89	76	69	20	100	100	100	0
6	101	88	86	15	100	100	100	0
12	106	85	80	26	100	100	100	0
10	97	81	72	25	100	100	100	0
16	93	79	78	15	100	100	100	0
20	96	79	76	20	100	100	100	0
13	86	65	66	20	100	100	100	0
10	100	90	75	25	100	100	100	0
14	98	80	70	28	100	100	100	0
16	101	81	74	27	100	100	100	0
20	105	90	85	20	100	100	100	0
24	98	82	76	22	100	100	100	0
22	100	88	82	18	100	100	100	0
20	101	92	86	15	100	100	100	0
16	98	88	78	20	100	100	100	0
16	96	76	72	24	100	100	100	0
16	98	84	80	18	100	100	100	0
20	98	86	76	22	100	100	100	0
12	101	88	82	19	101	100	100	0
20	92	80	72	20	102	100	100	0